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**Abstract**

# THE PRESTRESSED CONCRETE PRESSURE-VESSELS OF THE FRENCH NATURAL URANIUM-GRAPHITE-CARBON DIOXIDE GAS SEQUENCE REACTORS

by

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The first prestressed concrete pressur-vessels for nuclear reactors were built at Marcoule between 1956 and 1960 by the French Atomic Energy Authority (C.E.A.).

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After recalling the features of these pressure-vessels, the report defines the basic components and describes the pressure-vessels of the reactors of EDF 3 and EDF 4 power stations, built respectively at Chinon and at St-Laurent-des-Eaux by Electricité de France.

The pressure-vessel of EDF 3 power station, designed for an operating pressure of 30 atmospheres, has approximately the shape of a parallélépipède with a square base with sides 25 mètres long, and is 32 mètres high ; its effective capacity is bounded by a cylinder 19 mètres in diameter and 21 mètres high.

The pressure-vessel of EDF 4 power station, which houses the reactor core and the heat exchangers, is designed for an operating pressure of 29 atmospheres ; its effective capacity is bounded by a cylinder 19 mètres in diameter and about 37 mètres high.

The design of these structures sets many problems, wich can only be overcome after trials on scale models.

Since the high temperatures reached by the carton dioxide gas are today considered incompatible with prestressed concrete, the concrete has to be insulated from the gas and cooled ; many tests have been carried out and new solutions found for these problems.

The inclusion of the primary circuit within the reactor pressure-vessel meant such huge dimensions that prestressed concrete was the only feasible solution ; any development of natural uranium-graphite-carbon dioxide gas type reactors are therefore tied to the development of this technique ; problems concerning the use of prestressed concrete for reactor pressure-vessels are at present being subjected to various studies in France.